40G QSFP+ Active Optical Cable (AOC)

Overview

The Wave2Wave 40G QSFP+ Active Optical Cable (AOC) is a high-performance, parallel 40Gb/s Quad Small Form-Factor Pluggable (QSFP+) solution engineered for modern high-speed data center and computing environments. Designed for superior reliability and scalability, it integrates four independent full-duplex lanes—each supporting data rates up to 10.3125 Gbps—via 850nm VCSEL transmitters and PIN photodiode receivers. Compliant with the QSFP MSA and IEEE 802.3ba 40GBASE-SR4 standards, it ensures seamless compatibility with Ethernet, Fiber Channel, PCIe, and InfiniBand applications.

The cable supports OM3 multimode fiber up to 100 meters, featuring a 38-pin edge connector for electrical interfacing. With hot-pluggable capability, compact form factor, and low power consumption, it is ideal for short-reach, high-density data transmission in data centers and high-performance computing (HPC) environments.



Features and Benefits

- Compliant with SFF-8436 QSFP+ transceiver standards.
- Four full-duplex channels, each up to 10.3125 Gbps.
- Single 3.3V power supply with low power consumption (≤1.5W typical).
- Hot-pluggable for simplified installation and maintenance.
- Supports OM3 multimode fiber up to 100m.
- RoHS compliant and environmentally friendly.
- Operational temperature range: 0°C to 70°C.

Applications

- 10GBASE-SR and 40GBASE-SR4 Ethernet links.
- InfiniBand QDR (4x10G), DDR (4x5G), and SDR (4x2.5G) interconnects.
- High-speed interconnects for HPC and Data Center Interconnects (DCI).
- Scalable optical backplane and aggregation networks.

Absolute Maximum Rating

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.3	3.6	V
Input Voltage	Vin	-0.3	Vcc + 0.3	V
Operating Temperature	Top	0	70	°C
Storage Temperature	Tst	-20	85	°C
Humidity (non-condensing)	Rh	5	85	%

Recommended Operating Conditions					
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Operating Case Temperature	Tc	0	-	70	ºC
Supply Voltage	Vcc	3.13	3.3	3.465	V
Data Rate Per Line			10.3125	11.1	Gbps
Receiver Differential Data Output Load			100		Ohms
Logic Input Voltage High	Vih	2		Vcc	V
Logic Input Voltage Low	Vil	0		0.8	V
Two Wire Serial Interface Clock Rate			100	400	kHz
Power Supply Noise				50	mVpp
Fiber Bend Radius	Rb	3			cm

Electrical Characteristics						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Power Consumption				1.5	W	Single end
Maximum Peak Current				900	mA	Single end
Bit Error Rate	BER			10^{-12}		PRBS 2^{-31} @10.3125Gbps
Transmitter						
Differential Input Impedance	Zind	90	100	110	ohm	AC couple inside module
Differential Input Voltage Peak-to-Peak Swing	Vinpp	300		1000	mV	
AC Common-Mode Input Voltage Tolerance (RMS)		15			mV	
J2 Jitter Tolerance	Jt2			0.17	UI	
J9 Jitter Tolerance	Jt9			0.29	UI	
Receiver						
Differential Output Impedance	Zod	90	100	110	ohm	AC couple inside module
Differential Data Output Voltage Peak-to-Peak Swing	Vopp	500		800	mV	
J2 Output	Jo2			0.42	UI	
J9 Output	Jo9			0.65	UI	

Pin Assignment

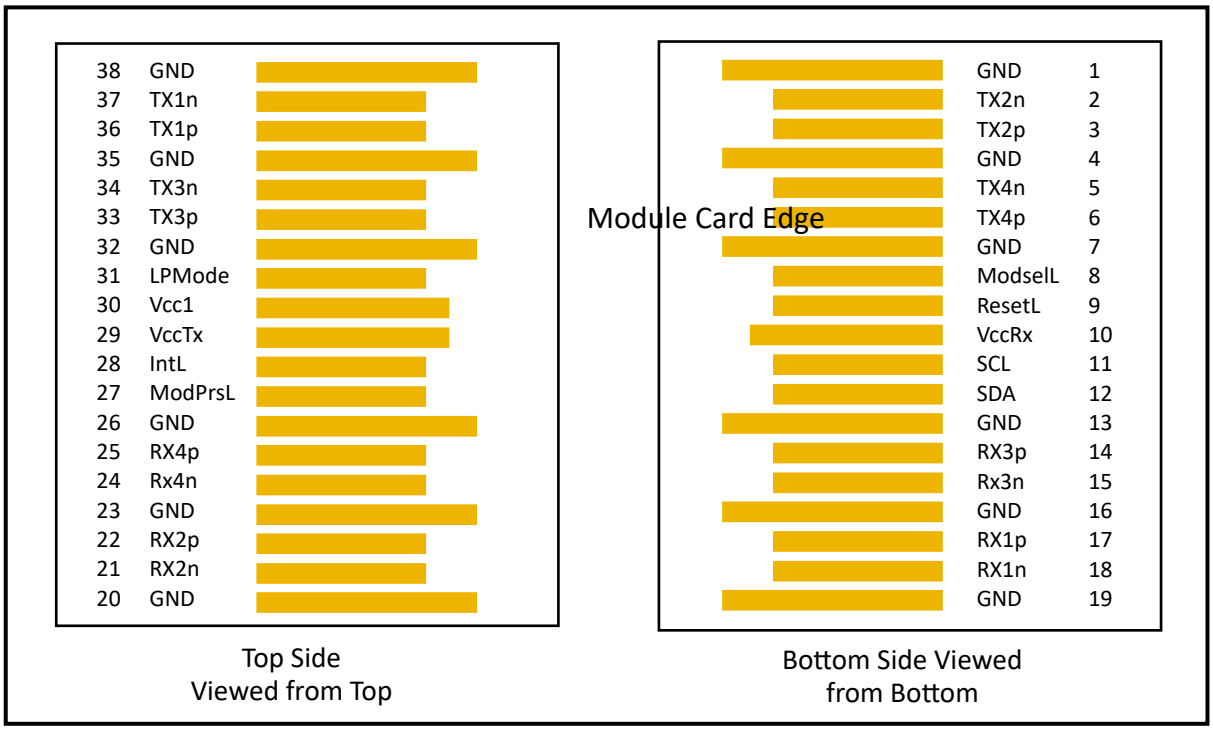


Figure 1. QSFP+ MSA Compliant 38-pin connector

Pin Description

Pin	Name	Description	Notes
1	GND	Module Ground	1
2	Tx2n	Transmitter inverted data input	
3	Tx2p	Transmitter non-inverted data input	
4	GND	Module Ground	1
5	Tx4n	Transmitter inverted data input	
6	Tx4p	Transmitter non-inverted data input	
7	GND	Module Ground	1
8	ModSelL	Module Select	3
9	ResetL	Module Reset	3
10	Vcc Rx	+3.3V Power Supply Receiver	2
11	SCL	2-wire serial interface clock	3
12	SDA	2-wire serial interface data	3
13	GND	Module Ground	1
14	Rx3p	Receiver non-inverted data output	
15	Rx3n	Receiver inverted data output	
16	GND	Module Ground	1
17	Rx1p	Receiver non-inverted data output	

Pin	Name	Description	Notes
17	Rx1p	Receiver non-inverted data output	
18	Rx1n	Receiver inverted data output	
19	GND	Module Ground	1
20	GND	Module Ground	1
21	Rx2n	Receiver inverted data output	
22	Rx2p	Receiver non-inverted data output	
23	GND	Module Ground	1
24	Rx4n	Receiver inverted data output	
25	Rx4p	Receiver non-inverted data output	
26	GND	Module Ground (internally pulled down to GND)	1
27	ModPrsl	Module Present	
28	IntL	Interrupt	3
29	Vcc Tx	+3.3V Power Supply Transmitter	2
30	Vcc1	+3.3V Power Supply	2
31	LPMode	Low power mode	
32	GND	Module Ground	1
33	Tx3p	Transmitter non-inverted data input	
34	Tx2n	Transmitter inverted data input	
35	GND	Module Ground	1
36	Tx1p	Transmitter non-inverted data input	
37	Tx1n	Transmitter inverted data input	
38	GND	Module Ground	1

NOTES:

1. GND is the signal and supply (power) common for the QSFP+ module. It is isolated from module chassis ground within the module. All the common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Vcc Rx Vcc1 and VccTx may be internally connected within the QSFP+ module in any combination. The connector pins are each rated for a maximum current of 500 mA.
3. Open collector, should be pulled up with 4.7k~10k ohms on host board to a voltage between 3.15V and 3.6V.